

WHAT IS CLAIMED IS:

1.) An isolated or purified nucleic acid which codes for an I_h ion channel or a part thereof, or a nucleic acid complementary thereto, except for the nucleic acids with the sequences indicated in the GenBank database under the accession number AF028737 and in the ENHUM database under the accession number N72770, wherein said nucleic acid is DNA or RNA.

2.) The isolated or purified nucleic acid of claim 1, characterized in that the nucleic acid is of human origin.

Sub B4 3.) The isolated or purified nucleic acid of claim 2, characterized in that the nucleic acid comprises the sequence according to SEQ ID NO 1 or a part thereof.

4.) The isolated or purified nucleic acid of claim 1, characterized in that the nucleic acid is of rat origin.

5.) The isolated or purified nucleic acid of claim 4, characterized in that the nucleic acid comprises the sequence according to SEQ ID NO 2 or a part thereof.

6.) The isolated or purified nucleic acid of claim 1, characterized in that the nucleic acid is of bovine origin.

7.) The isolated or purified nucleic acid of claim 6, characterized in that the nucleic acid comprises a sequence according to SEQ ID NO 3 or SEQ ID NO 12 or a part of either of the foregoing sequences.

8.) The isolated or purified nucleic acid of claim 1, characterized in that the nucleic acid is of sea urchin origin.

9.) The isolated or purified nucleic acid of claim 8, characterized in that the nucleic acid comprises the sequence according to SEQ ID NO 4 or a part thereof.

10.) The isolated or purified nucleic acid of claim 1, characterized in that the nucleic acid is of *Drosophila* origin.

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12. An isolated or purified nucleic acid characterized in that the sequence thereof is at least 80% identical to the isolated or purified nucleic acid of SEQ ID NO 1, 2, 3, 4 or 12.

13. The isolated or purified nucleic acid of claim 12, characterized in that the sequence thereof is at least 90% identical to the isolated or purified nucleic acid of SEQ ID NO 1, 2, 3, 4 or 12.

14. An isolated or purified nucleic acid characterized in that the nucleic acid hybridizes under low stringency conditions with SEQ ID NO 1, 2, 3, 4, 5 and/or 12.

15. The isolated or purified nucleic acid of claim 14, characterized in that the nucleic acid hybridizes under stringent conditions with SEQ ID NO 1, 2, 3, 4, 5 and/or 12.

16. A vector comprising the isolated or purified nucleic acid of claim 1.

17. A host cell comprising the vector of claim 16.

18 A composition comprising the isolated or purified nucleic acid of claim 1 and
19 a carrier therefor.

19. An isolated or purified polypeptide encoded by a nucleic acid of claim 1.

20. An isolated or purified polypeptide encoded by a nucleic acid of claim 3.

21. An isolated or purified polypeptide encoded by a nucleic acid of claim 5.

22. An isolated or purified polypeptide encoded by a nucleic acid of claim 7.

23. An isolated or purified polypeptide encoded by a nucleic acid of claim 9.

24. An isolated or purified polypeptide encoded by a nucleic acid of claim 11.

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25. An isolated or purified polypeptide encoded by a nucleic acid of claim 12.
26. An isolated or purified polypeptide encoded by a nucleic acid of claim 13.
27. An isolated or purified polypeptide encoded by a nucleic acid of claim 14.
28. An isolated or purified polypeptide encoded by a nucleic acid of claim 15.
29. A composition comprising the isolated or purified polypeptide of claim 19 and a carrier therefor.
30. A monoclonal antibody that specifically binds to the polypeptide of claim 19.
31. A method of screening a substance for the ability to influence the activity of an I_h ion channel, which method comprises:
- (a) providing a homogeneous I_h ion channel preparation,
 - (b) contacting the homogeneous I_h ion channel preparation with the substance,
 - (c) measuring the activity of the I_h ion channel preparation in the presence of the substance, and
 - (d) comparing the activity of the I_h ion channel preparation in the presence of the substance with the activity of the I_h ion channel preparation in the absence of the substance, wherein a change in the activity of the I_h ion channel preparation in the presence of the substance as compared to the activity of the I_h ion channel preparation in the absence of the substance indicates that the substance can influence the I_h ion channel.
32. The method of claim 31, wherein said I_h ion channel preparation is prepared by expressing the isolated or purified nucleic acid which codes for an I_h ion channel or a part thereof, or a nucleic acid complementary thereto, except for the nucleic acids with the sequences indicated in the GenBank database under the accession number AF028737 and in the ENHUM database under the accession number N72770, wherein said nucleic acid is DNA or RNA, in a host cell.
33. The method of claim 31, wherein said I_h ion channel preparation consists essentially of the polypeptide encoded by the isolated or purified nucleic acid which codes for an I_h ion channel or a part thereof, or a nucleic acid complementary thereto, except for the

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nucleic acids with the sequences indicated in the GenBank database under the accession number AF028737 and in the ENHUM database under the accession number N72770.

34. A method of diagnosing an I_h ion channel-associated disorder in a patient, which method comprises:

- (a) contacting a nucleic acid sample from said patient with a detectably labeled isolated or purified nucleic acid of claim 1 under hybridizing conditions,
- (b) detecting the label of the detectably labeled isolated or purified nucleic acid molecule, and
- (c) comparing the level of detection of the label in (b) with the level of detection of the label in a control sample, wherein a difference in the level of detection of the label in (b) and the level of detection of the label in a control sample is indicative of an I_h ion channel-associated disorder in a patient.

35. The method of claim 34, wherein the detectably labeled isolated and purified nucleic acid is mutated, in which case the detection of the label in (b) is indicative of the presence of a nucleic acid encoding a mutated I_h ion channel in the nucleic acid sample of the patient.

36. The method of claim 34, wherein said I_h ion channel-associated disorder is a cardiovascular disorder.

37. A method of prophylactically or therapeutically treating a mammal for a cardiovascular disorder, which method comprises administering to said mammal a vector comprising and expressing a prophylactically or therapeutically effective amount of an isolated or purified nucleic acid of claim 1, whereupon said mammal is treated for said cardiovascular disorder.

38. The method of claim 37, wherein said cardiovascular disorder is due to a faulty control of the sinus node.

39. A method of prophylactically or therapeutically treating a mammal for a cardiovascular disorder, which method comprises administering to said mammal a prophylactically or therapeutically effective amount of a polypeptide of claim 19, whereupon said mammal is treated for said cardiovascular disorder.

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40. The method of claim 39, wherein said cardiovascular disorder is due to a faulty control of the sinus node.

41. A method of prophylactically or therapeutically treating a mammal for a disturbance of consciousness, which method comprises administering to said mammal a vector comprising and expressing a prophylactically or therapeutically effective amount of an isolated or purified nucleic acid of claim 1, whereupon said mammal is treated for said disturbance of consciousness.

42. The method of claim 41, wherein said disturbance of consciousness is due to a malfunction in thalamic neurons.

43. A method of prophylactically or therapeutically treating a mammal for a disturbance of consciousness, which method comprises administering to said mammal a prophylactically or therapeutically effective amount of a polypeptide of claim 19, whereupon said mammal is treated for said disturbance of consciousness.

44. The method of claim 43, wherein said disturbance of consciousness is due to a malfunction in thalamic neurons.

45. A method of prophylactically or therapeutically treating a mammal for a pain state, which method comprises administering to said mammal a vector comprising and expressing a prophylactically or therapeutically effective amount of an isolated or purified nucleic acid of claim 1, whereupon said mammal is treated for said pain state.

46. A method of prophylactically or therapeutically treating a mammal for a pain state, which method comprises administering to said mammal a prophylactically or therapeutically effective amount of a polypeptide of claim 19, whereupon said mammal is treated for said pain state.

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